12-2012

DNA Technology in Court

Dan E. Krane
Wright State University - Main Campus, dan.krane@wright.edu

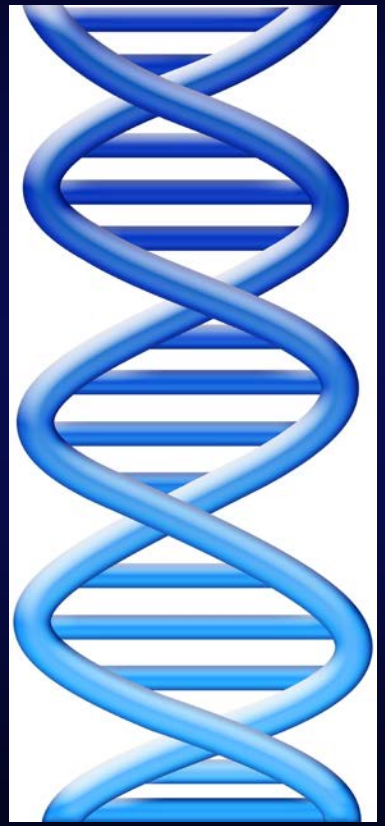
DNA technology in court

Dan E. Krane, Wright State University, Dayton, OH

Forensic DNA Profiling Video Series

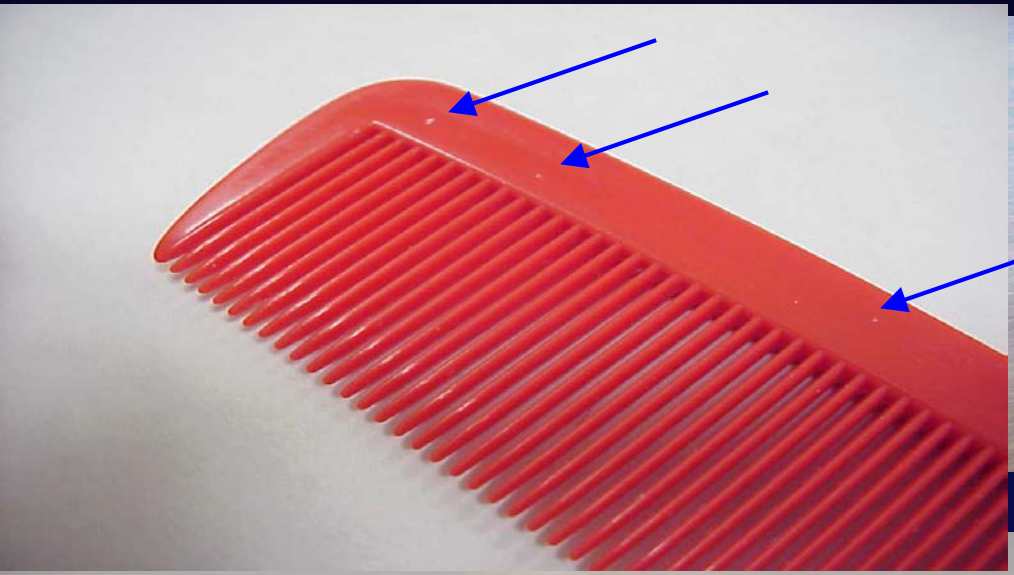
Forensic Bioinformatics
(www.bioforensics.com)

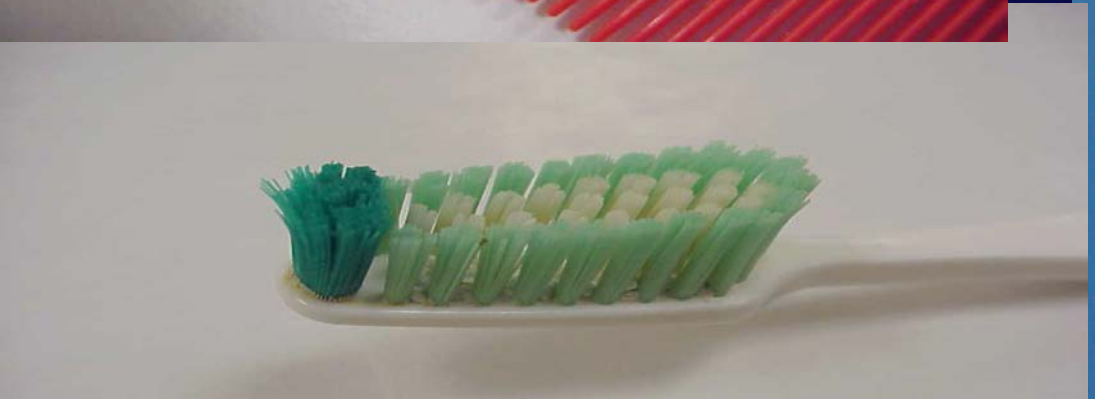
DNA technology in court



- Criminal Prosecution
  - Unprecedented sensitivity and specificity for typing biological samples
  - Growing use of databanks and dragnets to identify suspects
  - Rapidly becoming cheaper and faster

Possible DNA sources

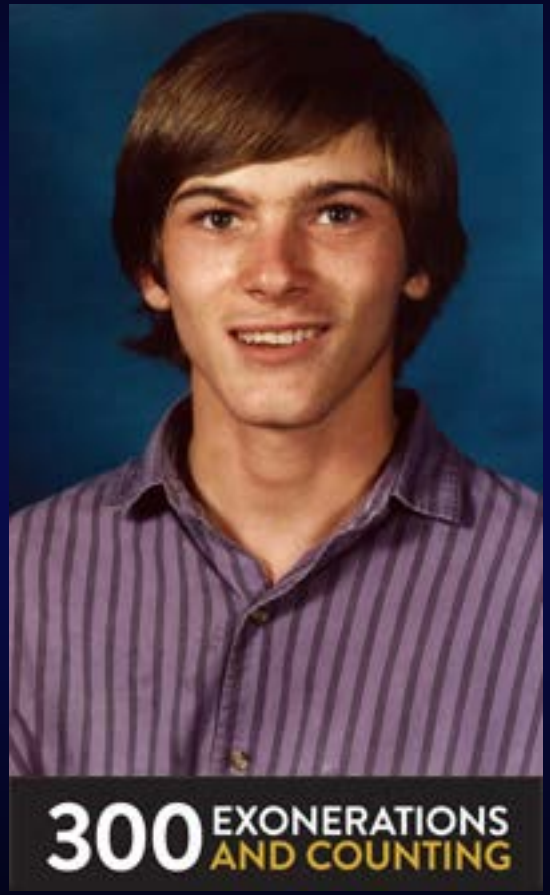




DNA technology in court

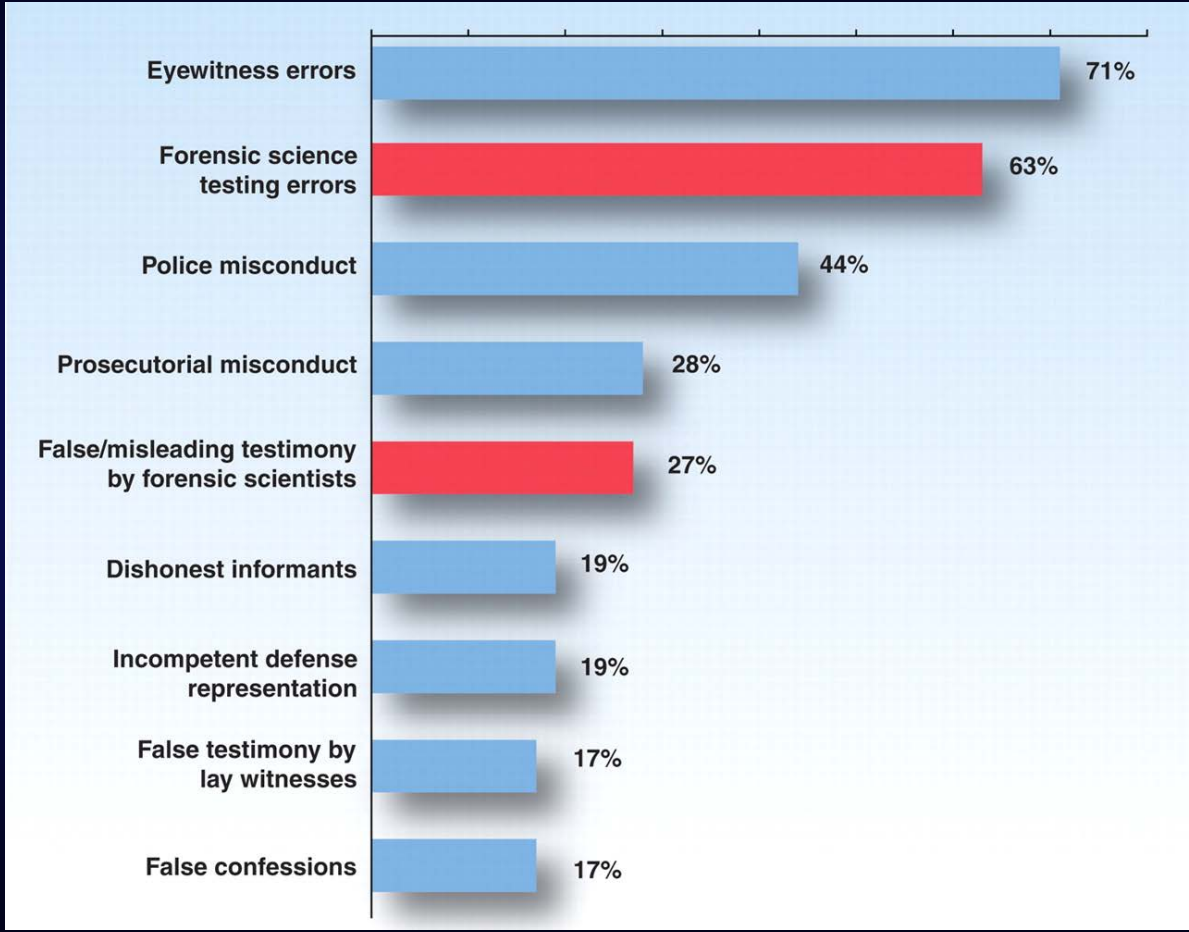
- Criminal Defense
  - Unprecedented sensitivity and specificity for typing biological samples
  - Potential support for alternative theories of the case
  - Generation of alternative suspects

DNA technology in court



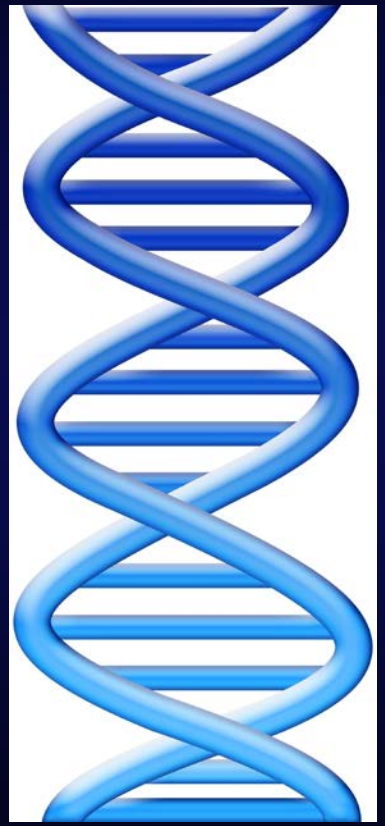
- Post-conviction exonerations (300 as of September, 2012) based on DNA evidence have revealed problems with the justice system

Factors associated with wrongful convictions



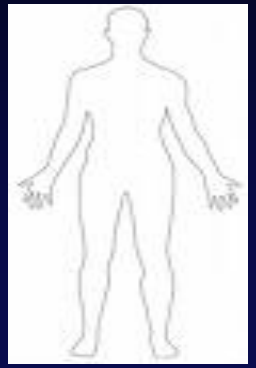
Saks & Koehler, *Science* (2005)

What is a good source of DNA?



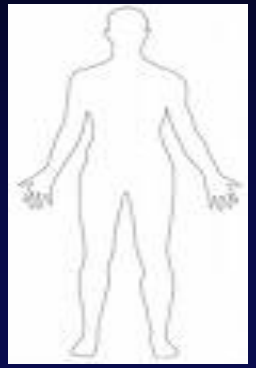
- Blood, saliva, semen, tissues, pretty much anything that comes in contact with a person.

DNA content of biological samples



Trillions of cells

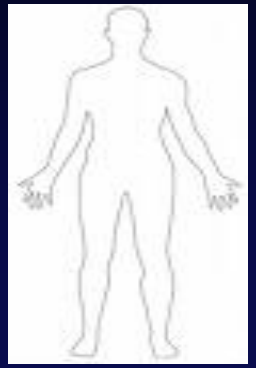
DNA content of biological samples



Trillions of cells

Roughly 100 cells

DNA content of biological samples



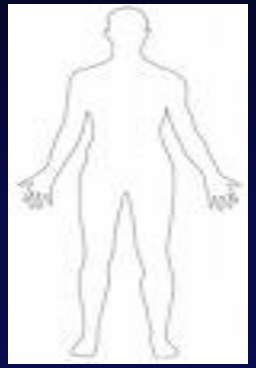
Trillions of cells

Roughly 100 cells

Each cell contains 6 to 7 pg of DNA

DNA profiling kits generally recommend using between 500 and 1,000 pg of template DNA

DNA content of biological samples



Trillions of cells

Roughly 100 cells

Each cell contains 6 to 7 pg of DNA

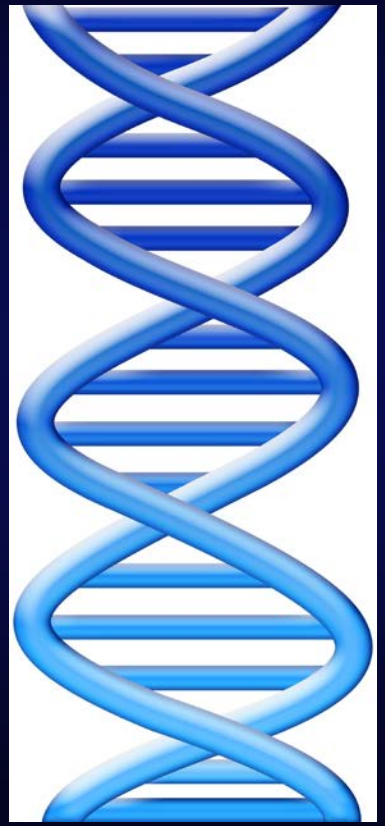
DNA profiling kits generally recommend using between 500 and 1,000 pg of template DNA

That works out to roughly 100 to 200 cells

What is a picogram?

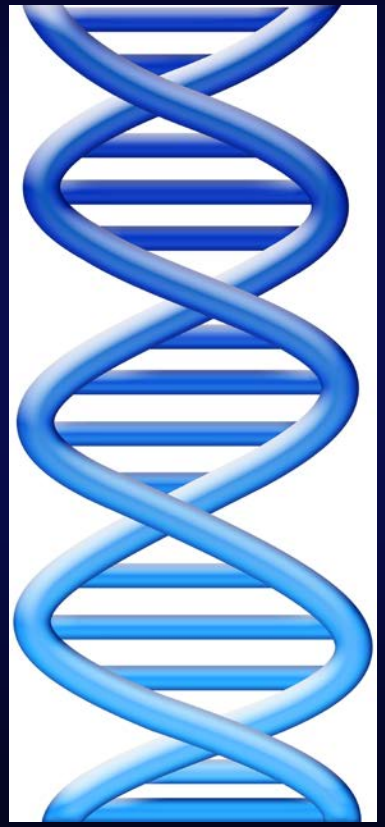
- 1 gram = 1/4th of a packet of sugar
- 1 milligram = a single crystal of sugar
- 1 nanogram = one 1000th of a crystal of sugar
- 1 picogram = one billionth of a gram

What is a good source of DNA?



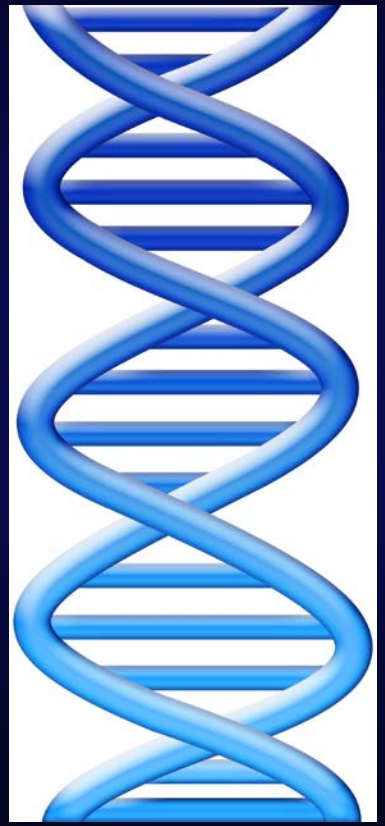
- Blood, saliva, semen, tissues, pretty much anything that comes in contact with a person.
- But, the presence of a DNA profile says nothing about the time frame or circumstances of its transfer.

How is DNA analyzed?



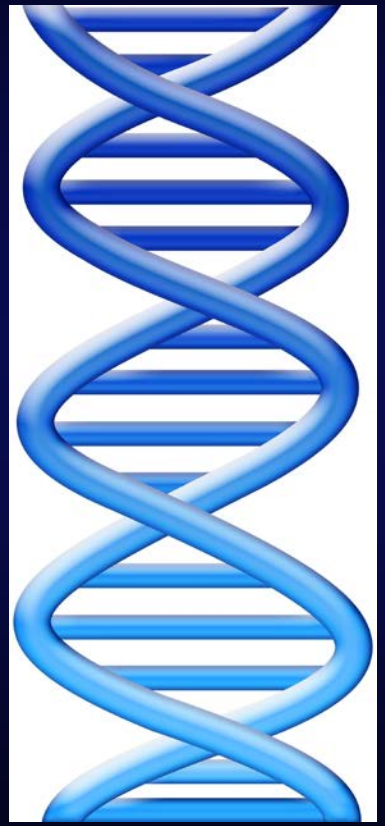
- Isolation and purification
- PCR amplification
- Size fractionation
- Computer processing
- Statistical weighting

DNA technology in court



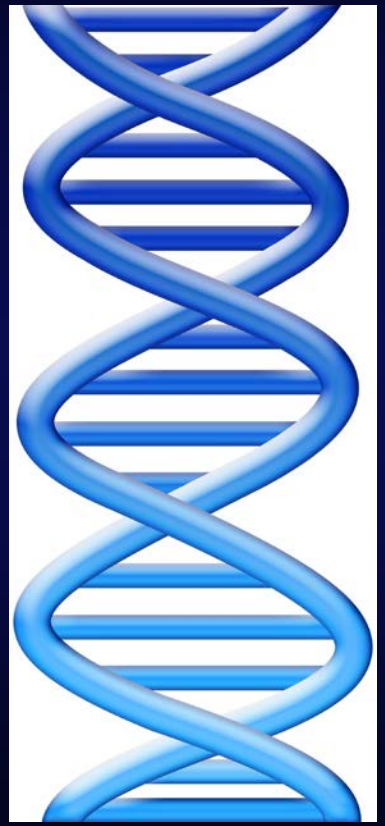
- Used in prosecutions, defenses, and post-conviction

DNA technology in court



- Used in prosecutions, defenses, and post-conviction
- DNA tests are very sensitive

DNA technology in court



- Used in prosecutions, defenses, and post-conviction
- DNA tests are very sensitive
- Test results need to be interpreted carefully

DNA technology in court

Dan E. Krane, Wright State University, Dayton, OH

Forensic DNA Profiling Video Series

Forensic Bioinformatics
(www.bioforensics.com)